**Genetic Engineering**

Genetic engineering is the process of changing the genes in living things. (A gene is a segment of DNA that determines traits like like eye color.) By changing the genes in living things, scientists can create new animals or plants. They can also try to end certain diseases.

In genetic engineering, scientists copy a gene of a living thing. Then they add the copy to a different living thing. This creates a new species. The new species is called a genetically modified organism. This means that the new species was made by changing a gene.

**Steps in Genetic Engineering**

Scientists must first find the gene they need to change. Genes are located on chromosomes. (Chromosomes are rod-like structures made up of DNA that are usually found in the nucleus of a living cell.) Scientists study the organism's chromosomes and figure out where the gene is located. Then they make a copy of the gene.

The copy of the gene is put into a cell of another organism. Sometimes scientists use a a tool called a gene gun to do this. The gun shoots the copied gene right into the cell.

Once the new gene is in the cell, it changes the cell. Now the genetically modified organism can reproduce. The offspring that it makes will be a new animal or plant. The new animal or plant will be different because it will have new genes.

**Genetic Engineering in Plants**

Genetic engineering can make crops stronger and healthier so they can live in areas with little rain or bad soil. Some are even strong enough to live with weeds. This helps farmers grow more food.

Crops can also be made more nutritious, so people who eat them will be healthier. Some plants can be genetically modified to make them good for medicine or vaccines.

**Genetic Engineering in Animals**

Genetically modified animals often grow larger and stronger. Cows can make more milk and chickens can make more eggs. This helps farmers produce more food.

Someday scientists hope to use genetic engineering to create animals that have organs similar to humans. They hope the animal's organs can be used to replace people's organs that have failed because of sickness or disease. Many people's lives could be saved.

**Genetic Engineering in Humans**

Some diseases are inherited. This means they are passed down from parents to children. These illnesses are stored in their genes.

Scientists are working to use genetic engineering to replace the genes that carry disease with healthy genes. That way the child who is born to the genetically altered person will not have that disease. Soon no one will be born with an inherited disease. One example of an inherited disease is cystic fibrosis.

Scientist also hope to use genetic engineering in the future to make people's bodies stronger or healthier. They might also be able to make people's brains smarter. Then people would pass those changes on to their children. Later generations would be smarter and healthier.

**Problems with Genetic Engineering**

Not everyone believes genetic engineering is a good thing. Some people do not think scientists should be changing and creating life. They do not think people should be doing nature's job. Some people who are religious believe that only God should choose who will be born or which species should change.

Some people are worried about the effects of genetic engineering on nature itself. People who care about the environment think that new species might harm habitats. Because genetically modified plants and animals are much stronger and healthier than other plants or animals, they might take over an area. Then other species will have no place to live.

Another worry is that the genetically modified animals will have offspring with already existing species. Over time, the existing species may disappear because all the offspring being born will be a mix of their parents. This means they will have the new genes, too.

Scientists are working to learn more about genetic engineering and to come up with new ways to use it. They believe the benefits outweigh the risks.

**Source Citation:**  "Genetic Engineering." *Kids InfoBits Presents: Biology and Life Sciences*. Gale, 2009.   Reproduced in Kids InfoBits.  Detroit:  Gale, 2011.   http://galenet.galegroup.com/servlet/KidsInfoBits